

Chevrons

A brief introduction



First, what is a
Chevron?

chevron noun

 Save Word

chev·ron | \ 'shev-rən  \

Definition of *chevron*

: a figure, pattern, or object having the shape of a V or an inverted V: such as

- a** : a heraldic charge consisting of two diagonal stripes meeting at an angle usually with the point up
- b** : a sleeve badge that usually consists of one or more chevron-shaped stripes that indicates the wearer's rank and service (as in the armed forces)

Illustration of *chevron*



chevrons b: 1 marine staff sergeant, 2 air force staff sergeant, 3 army staff sergeant

U.S. Army Corps of Engineers

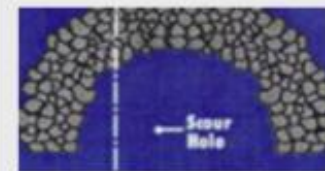
What are River Training Structures?

River training structures are manmade structures designed and constructed in a river reach to modify the hydraulic flow and sediment response of a river. Some examples of manmade river training structures are dikes, chevrons, bendway weirs, and bank revetments.



Chevrons

Chevrons are dike structures designed as a blunt nosed, arch shape. They are constructed parallel to flow and like regular dikes utilize the energy of the river to redistribute flow and sediment. They are usually placed adjacent to the river bank to allow flow separation and create both channel deepening, side channel development, and middle bar formation.



Chevron Hydraulics

- Blunt nose of chevron separates incoming flow
- Scouring occurs along edges of chevron
 - Transition of flow velocity around chevron is smooth, not compromising stability or integrity of structure (Singh and Sharma, 2014)
- Scoured sediment is deposited in low velocity zone downstream of chevron
- Channel is deepened on either side of structure

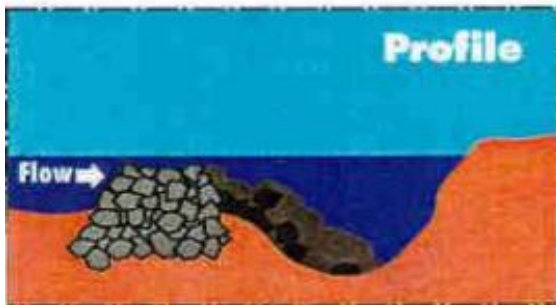
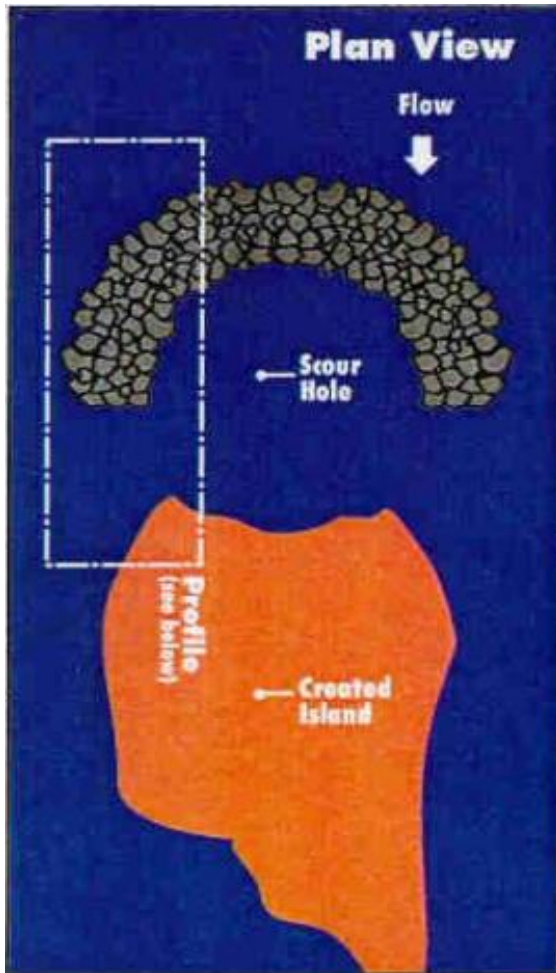
Chevron Function



- Chevrons work best when used in series
- These chevron dikes are oriented so that water is pushed towards the main navigation channel
- Natural features of the secondary channel can be protected in this manner

Island Formation

- Keep sediment out of main channel
- Habit formation



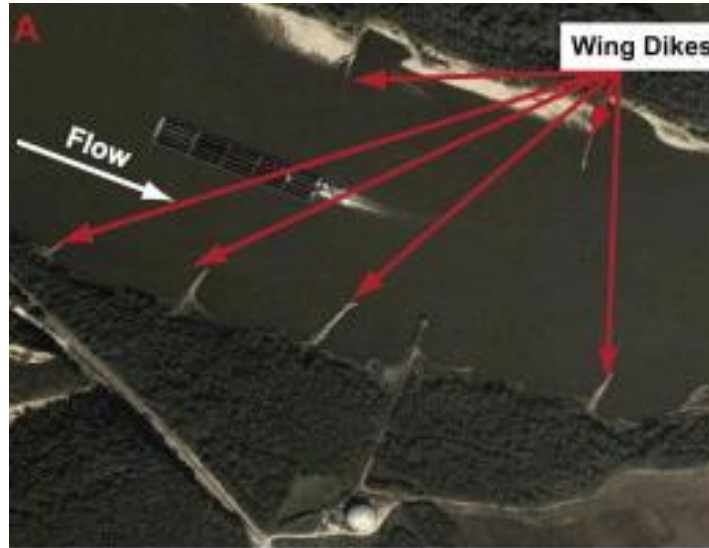


Dredging is an extremely expensive and environmentally damaging method of combating sedimentation in navigation channels. Chevrons can reduce the need for dredging by directing sedimentation into well defined deposition zones that are outside of main channel. If and when dredging is needed, islands and scour holes created by chevrons can be used as a location to deposit dredged sediment.

Dredging

Environmental Impacts of River Training Structures

- River training structures simplify channel morphology
- Diversity of aquatic habitat is reduced
- Chevron dikes may actually improve aquatic habitat



Influence of Chevrons on Aquatic Habitat

- Assessment of chevron dikes for the enhancement of physical-aquatic habitat within the Middle Mississippi River, USA (Remo, Khanal and Pinter, 2013)
- Habitat as regarded as “a complex product of physical, chemical, biological factors that interact to sustain a set of organisms” was evaluated
- Chevron dikes increase over-wintering habitat for riverine fish
- Diversity of physical-aquatic habitat were increased by 8-35% from pre-chevron to post-chevron

Chevrons provide function with added environmental gains!

References

- Remo, J. W. F., Khanal, A., & Pinter, N. (2013). Assessment of chevron dikes for the enhancement of physical-aquatic habitat within the Middle Mississippi River, USA. *Journal of Hydrology*, 501, 146–162.
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